



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

H.D.

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/564,416	01/12/2006	Masanobu Ando	F05-420-US	7394
21254 7590 01/03/2007 MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817			EXAMINER CRANE, SARA W	
			ART UNIT	PAPER NUMBER
			2811	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/03/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/564,416

Applicant(s)

ANDO ET AL.

Examiner

Sara W. Crane

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1 and 2, the composition ratio of In is not clear. Applicant states in the Remarks of 3 October 2006 that "the composition ratio is the ratio of atoms to the whole number of atoms constructing the semiconductor." (page 6, sixth paragraph). The paragraph then considers the example of AlGaInN, and concludes with the statement, "the composition ratio x of In is the ratio of the number of atoms of In to the whole number of atoms (Al+Ga+In)." So which is it? The whole number of atoms in the semiconductor would include the number of atoms of N, as well as the number of atoms of Al, Ga, and In. So does the composition ratio of claims 1 and 2 refer to the ratio of the number of In atoms to the number of Al+Ga+In atoms? Or does the composition ratio of claims 1 and 2 refer to the ratio of the number of In atoms to the number of Al+Ga+In+N? Applicant states that the specification at page 4, lines 7-13, makes clear the meaning of the term composition ratio. This paragraph uses the term, but its meaning is not set forth. Also, the term is used throughout the art, but sometimes it means the ratio as compared to the total number of atoms in the semiconductor, and sometimes it means the ratio as compared only to the type III atoms (assuming a III-V semiconductor). So the metes and bounds of the claims are still not clear.

Also, claim 5 refers to a gradient of the function  $a$ , where  $a$  is varying with  $z$ .

Claim 1 does not set forth explicitly the requirement that this function have a well-defined gradient at each place. Yet claim 5 would not make sense unless the function does have a well-defined gradient at each place. So, does claim 1 require implicitly that the function  $a$  has a well-defined gradient at each place? Or is this a requirement only of claim 5? In other words, as noted by the European examiner, a rectangular wave would have a waveform, with a given period, as in the reference of Kneissl et al. Such a waveform could correspond to stepwise variation in composition, but at the position of the step there would not be a well-defined gradient. Delta doping could also give rise to a periodic waveform with no well-defined gradient. Perhaps the claim limitation in claims 1 and 2 of an active layer "having a single layer structure" is intended to exclude such waveforms (because one could always say that the steps of a rectangular waveform are different layers). But the record is not really clear as to whether claims 1 and 2 require a smooth variation in the In concentration, or whether the claims encompass discontinuous variations in the In concentration.

Examiner assumes that the composition ratio of claims 1 and 2 probably refers to the ratio of In to the total of the type III atoms in the material (because one would tend to associate the claim language with the "x" in the formulas). Also, the claims are understood to require a smooth variation in the In concentration. The prior art does not appear to teach the subject matter of the pending claims, based on these assumptions.

Art Unit: 2811

But some clarification is needed, as noted above, in order to understand what is actually encompassed by the claim language.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Crane, whose telephone number is (571) 272-1652.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Sara W. Crane  
Primary Examiner  
Art Unit 2811